Contr. Univ. Michigan Herb. 24: 173–187. 2005.

NEW EUPHORBIACEAE FROM MEXICO. II.

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Recent estimates of the number of species of Euphorbiaceae in Mexico vary from 782 (Steinmann 2002) to 826 (Martínez et al. 2002), and the state of Michoacán possesses a rich diversity of these. Rodríguez and Espinosa (1996) reported the presence of 127 species and 19 genera for the state, whereas Martínez et al. (2002) reported 164 species and 20 genera. I estimate that the actual number of taxa is closer to the latter value and even slightly higher with about 185 species and 21 genera present. Here six new species are described from Michoacán.

Croton atrostellatus V. W. Steinmann, sp. nov.—TYPE: MEXICO. Michoacán: Mpio. Angamacutiro, along the road from Panindícuaro to Villachuato, 18 km NE of the Guadalajara–México Autopista and 4.5 km NE of Pueblo Nuevo, 20°06'35"N, 101°41'05"W, ca. 1800 m, 19 Jun 2001, *V. W. Steinmann 1681* (holotype: IEB!; isotypes: ARIZ! DAV! MICH! WIS!). Fig. 1.

Frutex 2–5 m altus, monoecius, trichomatibus atris dispersis vestitus; folia alterna, stipulae subulatae, 2.6–6.5 mm longae, petioli 1–3 cm longi, stellato-tomentosi, laminae plerumque ovatae, 2.5–9 cm longae, 1.8–6 cm latae, bicolores, apice acutae vel acuminatae, basi rotundatae vel leviter cordatae, supra stellato-puberulae, subtus stellato-tomentosae, margine serrulato-denticulato; inflorescentiae terminales, floribus pistillatis (4–) 6–9, staminatis usque ad ca. 60, bracteae subulatae vel lineares, 1.2–3.1 mm longae, stellato-tomentulosae; florum staminatorum calyx lobis 5, 2.2–2.8 mm longis, 1.3–1.9 mm latis, petala albida, anguste elliptica, 3.1–3.6 mm longa, stamina 15 vel 16, filamenta filiformia 3.0–3.6 mm longa, villosa, antherae ellipticae, 1.0–1.2 mm longae; florum pistillatorum calyx lobis 5 (6), aequalibus, ovatis vel oblongis, 3.9–5.2 mm longis, 2.8–3.6 mm latis, ovarium trilobatum, stellato-tomentosum, styli 3, bis bipartati, 3.2–3.9 mm longi, filiformes; capsula depresso-subglobosa, ca. 6.5 mm longa et 8 mm lata; semina oblonga, 5.2–5.7 mm longa, 3.8–4.2 mm lata, complanata, nitida, caruncula 0.8–1.0 mm longa, 1.6–2.1 mm lata.

Shrubs, sometimes aborescent, 2–5 m tall, highly branched, drought-deciduous, monoecious; stems stellate-tomentose when young, often with a dingy-yellow cast, with scattered black hairs throughout the whole plant, bark reddish brown. Leaves alternate, well-spaced on the stem; stipules 2.6–6.5 mm long, subulate, pilose to tomentulose; petioles 1–3 cm long, stellate-tomentose, lacking glands; blades 2.5–9 cm long, 1.8–6 cm wide, membranaceous, unlobed, pinnately veined, usually ovate, rarely elliptic or oblong, apex acute to acuminate, base rounded to slightly cordate, distinctly bicolored, adaxially stellate-puberulent, green, abaxially stellate-tomentose, white to dingy yellow, margin serrulate-denticulate, sometimes irregularly so and appearing erose. Inflorescence a terminal racemelike thyrse to 11 cm long with (4–) 6–9 pistillate flowers towards the base and up to ca. 60 staminate flowers along the proximal portion, pistillate flowers sometimes abortive and the inflorescence then appearing unisexual, bracts 1.2–3.1 mm long, subulate to linear, stellate-tomentulose, bracteoles

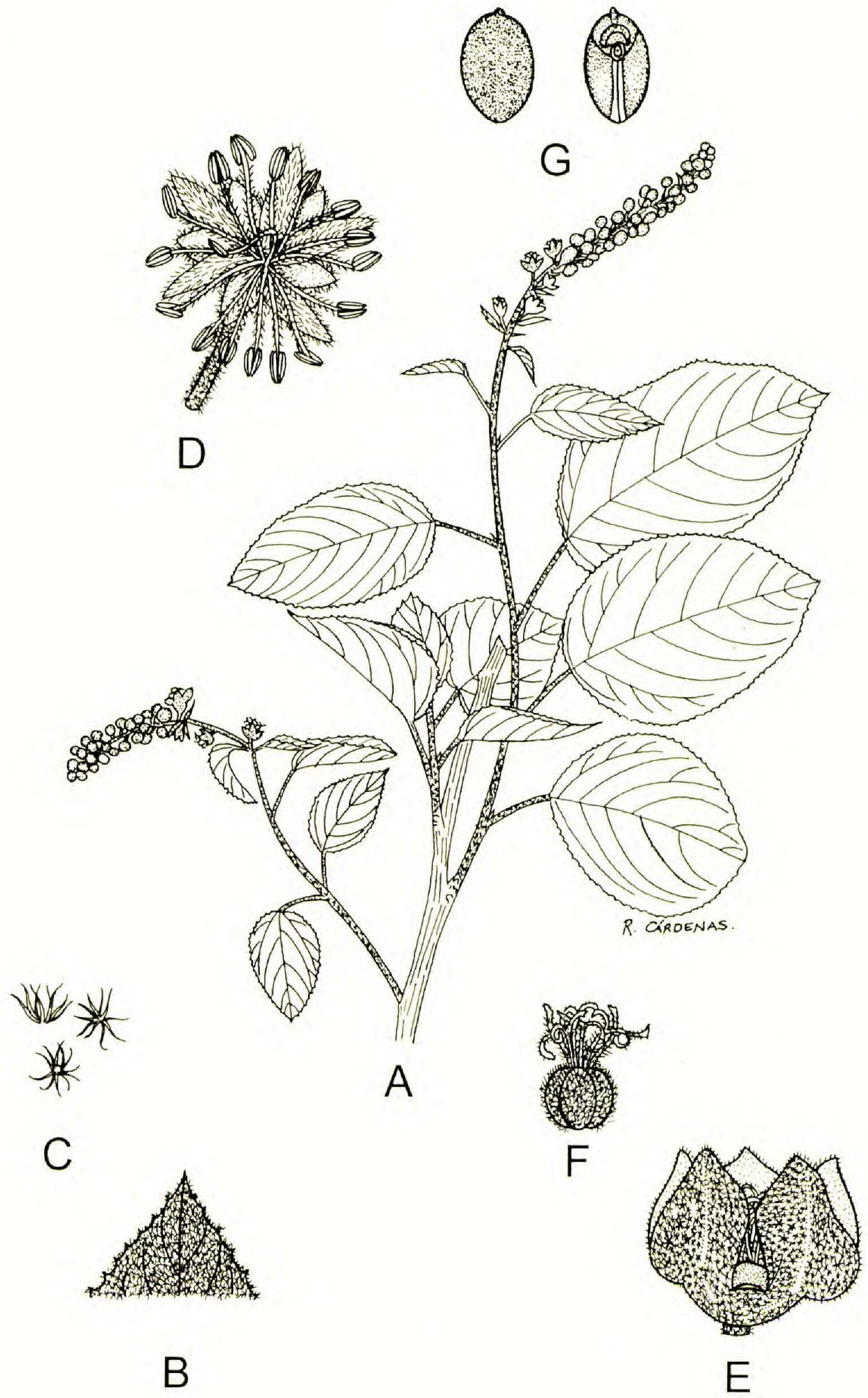


FIG. 1. *Croton atrostellatus*. A. Flowering branch, ×0.5. B. Leaf apex, ×1. C. Stellate hairs, ×20. D. Staminate flower, ×4. E. Pistillate flower, ×4. F. Ovary, ×4. G. Seed, dorsal and ventral views, ×2.

0.4–1.1 mm long, filiform, pilose. Staminate flowers on slender, stellate-tomentose pedicels 2.2–3.1 mm long; calyx 5-partite, lobes 2.2–2.8 mm long, 1.3–1.9 mm wide, triangular-ovate to broadly elliptic, equal, free to nearly the base, apex bluntly pointed, stellate-tomentose on the outside, glabrous within; petals 5, 3.1–3.6 mm long, 0.7–0.9 mm wide, narrowly elliptic, whitish, free to the base, apex rounded, glabrous on the outside, villose within and along the margin; stamens 15 or 16, filaments 3.0–3.6 mm long, filiform and flexuous, villous especially towards the base, anthers 1.0–1.2 mm long, 0.3–0.4 mm wide, narrowly elliptic. Pistillate flowers on stout pedicels 1 mm long or less; calyx valvate-reduplicate (i.e., with adjacent pairs of valvate sepals forming a

projection at the base), sepals 5 (6) united ca. 1/4 to 1/3 their length, the lobes ovate to oblong, somewhat accrescent in fruit and enlarging to 3.9–5.2 mm long, 2.8–3.6 mm wide, apex rounded, stellate-tomentose on the outside and along the inner edges, inner surface otherwise glabrous; petals sometimes present, to 4.3 mm long, strap-like; ovary 3-lobed, stellate-tomentose, styles 3, filiform, 3.2–3.9 mm long, twice bifid, rusty-brown, with numerous stellate trichomes. Capsule ca. 6.5 mm long, ca. 8 mm in diameter (estimates only; fruits had already begun to dehisce), depressed-globose; columella 5–5.5 mm long. Seeds 5.2–5.7 mm long, 3.8–4.2 mm wide, oblong in dorsal view, dorsal-ventrally flattened, rounded at the base, rounded and with a minute nipplelike projection at the apex, microscopically rugulose, shiny; caruncle 0.8–1.0 mm long, 1.6–2.1 mm wide, tan and thin.

ADDITIONAL SPECIMEN EXAMINED. **Mexico**. MICHOACÁN: Mpio. Angamacutiro, vertiente S del Cerro Tres Reyes, cerca de Angamacutiro, *Rzedowski 52696* (IEB).

The epithet *atrostellatus* refers to the black stellate trichomes that are scattered throughout the plant. I am unaware of this feature in any other Mexican species of *Croton*, and its occurrence serves to separate this taxon from all others in western Mexico. Some areas of the plant actually appear to the naked eye to be infested by a rust, but it is in fact a proliferation of these black trichomes that causes this illusion. According to the infrageneric circumscription of Webster (1993), the presence of valvate-reduplicate pistillate sepals, eglandular stipules and sepals, and a stellate pubescence warrants the placement of *Croton atrostellatus* in section *Lasiogyne* (Klotzsch) Baill. No other members of this section are known from western tropical Mexico (Webster 2001), and the only representative given for Mexico by Webster in his 1993 conspectus is *C. tabascensis* Lundell. Apart from lacking the characteristic black trichomes, *C. tabascensis* differs in having hispid young stems, leaves that are not bicolored and only moderately stellate-pubescent beneath, and sepals that are uniformly pubescent on the inner surface. Also, although supposedly not characteristic of the section *Lasiogyne*, in *C. tabascensis* the sepals of the pistillate flowers possess small, sessile glands. *Croton atrostellatus* is known from only two collections in the subtropical scrub of the Bajío region in northwestern Michoacán at elevations from 1800 to 1900 m. At the type locality it grows sympatrically with *C. adspersus* Benth. and *C. sphaerocarpus* H. B. K. It was collected with flowers in June and with fruits in October.

Euphorbia calderoniae V. W. Steinmann, sp. nov.—TYPE: MEXICO. Michoacán: Mpio. Cuanajo, Cerro del Burro, pastizal, ladera de cerro, potrero, 2500 m, 3 Dec 1985, *J. M. Escobedo 756* (holotype: IEB!; isotype: MICH!).

Herba annua, prostrata; caules usque ad 20 cm longi, supra pilosi vel puberuli, infra glabri, teretes; folia opposita, petioli 0.3–0.5 mm longi, laminae obovatae vel oblongae, 0.3–0.6 cm longae, 0.2–0.4 cm latae, basi asymmetricae, rotundatae vel hemicordatae, apice obtusae, margo integer vel serrulatus; cyathia solitaria, pedunculi 0.3–1.2 mm longi, glabri; involucra infundibularia vel fere cylindrica, 0.7–0.9 mm longa, 0.6–0.7 mm lata, interne pubescentia, glandulae 4, circulares vel ovales, ca. 0.1 mm longae et latae, appendices ut videtur absentes vel angustae, 0.1 mm longae, 0.2 mm latae, flores staminati 5–8; ovarium trilobatum, subglobosum vel ovoideum, glabrum, styli 3, liberi, 0.3–0.4 mm longi, bipartiti; capsula trilobata, subglobosa vel ovoidea, 1.3–1.4 mm longa, 1.5–1.6 mm lata; semina triangula, ovoidea, 0.8–0.9 mm longa, 0.6–0.7 mm lata.

Prostrate annual from a slender, brown, vertical taproot; stems few to many arising from near the base, to 20 cm long, generally mat-forming and extending radially, diffuse to compact, moderately to highly branched, internodes 0.5–2 cm long, terete, pilose to strigulose or puberulent, pubescent only on the exposed surfaces, glabrous on the portions facing the ground, hairs crisped to recurved or rarely almost straight, 0.1–0.4 mm long, white to purple-tinged. Leaves opposite; stipules of all parts of the stems similar, 0.2–0.5 mm long, divided into subulate divisions or represented by a small, triangular laciniately margined scale; petioles 0.3–0.5 mm long, glabrous or sparsely pilose with spreading white hairs to 0.7 mm long; blades 0.3–0.6 cm long, 0.2–0.4 cm wide, obovate to oblong, with a prominent midvein but the lateral veins inconspicuous, glabrous to sparsely pilose, base asymmetrical, rounded to slightly hemicordate, apex rounded at maturity although frequently acute when young, margin serrulate at least towards the tip but usually entire along the distal 1/2–1/3. Cyathia solitary in the distal nodes, peduncles 0.3–1.2 mm long, glabrous. Involucre 0.7–0.9 mm long, 0.6–0.7 mm wide below the glands, infundibuliform to nearly cylindrical, outer surface glabrous, inner surface pilose below the rim; lobes subulate, 0.1–0.3 mm long, sometimes divided, sinus shallow and inconspicuous; glands 4, ca. 0.1 mm long and wide, circular to oval, appendages absent or represented by a narrow rim ca. 0.1 mm long and 0.2 mm wide, glabrous, entire to wavy or bilobed, white to reddish. Staminate flowers 5–8, bracteoles few, filiform. Gynophore glabrous, exserted 0.9–1.7 mm, ovary 3-lobed, subglobose to ovoid, glabrous, styles 3, free, 0.3–0.4 mm long, biparted to nearly the base, divisions filiform. Capsule 1.3–1.4 mm long, 1.5–1.6 mm in diameter, strongly 3-lobed, subglobose to broadly ovoid, columella 0.9–1.0 mm long. Seeds 0.8–0.9 mm long, 0.6–0.7 mm wide, triangular in cross section, the ventral faces collectively forming a single face, ovoid in dorsal view, blackish to blackish gray, micropapilliate, apex bluntly pointed, base rounded, dorsal keel prominent, blunt, uninterrupted, dorsal faces mostly plane, 0.6 mm tall, smooth; caruncle absent.

Additional Specimens Examined. **Mexico**. Michoacán: Mpio. Quiroga, Cerro del Tzirate, *López 874a* (IEB); Mpio. Zinapécuaro, 5 km al SSE de Jeráhuaro, *Rzedowski 46145* (IEB); Mpio. Uruapan, 5 km al S de Angahuan, en el Llano Chorítiro, *Soto Núñez 13882* (MEXU).

The specific epithet *calderoniae* pays tribute to Graciela Calderón de Rzedowski, a researcher at the Instituto de Ecología-Centro Regional del Bajío and specialist of Mexican plants. She is coeditor of the *Flora del Bajío y de Regiones Adyacentes*, and all but one of the known collections of *Euphorbia calderoniae* occur within the boundaries of this Flora. *Euphorbia calderoniae* is a member of subg. *Chamaesyce*, and like so many other species of the subgenus, the seeds serve to distinguish it. In habit it resembles a prostrate and diminutive form of *Euphorbia nutans* Lag. and apparently is related to this species; however, from this and close allies it is separated by the possession of seeds with plane and smooth dorsal faces. In related species the dorsal faces are convex and variously sculptured. In addition, the ventral two faces of *E. calderoniae* form a single flat surface, whereas in related species the ventral two faces usually form a convex surface. The leaves of *E. calderoniae* are reminiscent of those of *E. serpyllifolia* Pers. in both shape and in being mostly entire along the proximal margin and only serrulate towards the apex; in addition to seed characters, the pubescent stems readily serve to distinguish *E. calderoniae* from this species. The four known localities of *E. calderoniae* are in the trans-volcanic region of northern Michoacán, where it is found in grasslands, humid canyons in pine-oak forest, and scrub vegetation at elevations from 2300 to 2500 m. Flowering and fruiting overlap broadly, and fertile material has been collected in August and December.

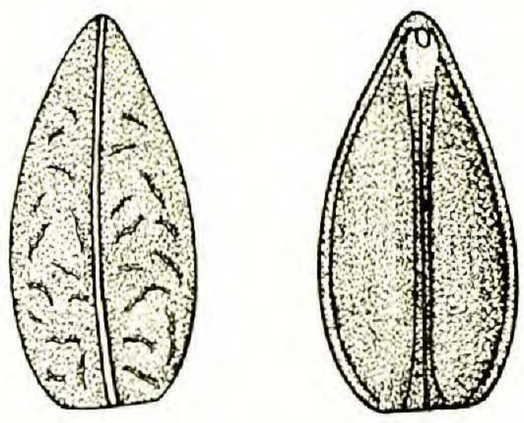
Euphorbia infernidialis V. W. Steinmann, sp. nov.—TYPE: MEXICO. Michoacán: Mpio. La Huacana, along MEX 37, ca. 1 km N of Los Ranchos, 18°44'N, 101°00'45"W, ± 200 m, 9 May 2002, *V. W. Steinmann, G. Puime & B. Vrskovy 2458* (holotype: IEB!). Fig. 2.

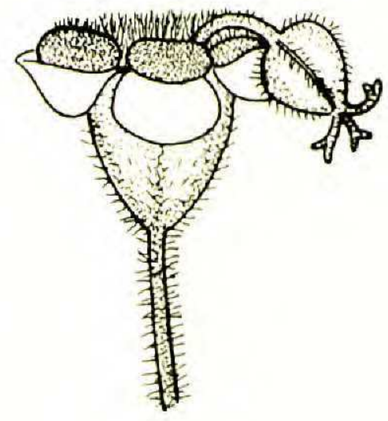
Herba perennis, prostrata vel ascendens; caules usque ad 25 cm longi, pilosi, teretes; folia opposita, petioli 0.3–0.8 mm longi, laminae variabiles, plerumque oblongae, 0.3–0.5 cm longae, 0.25–0.35 cm latae, basi asymmetricae et hemicordatae, apice obtusae, margo integer vel leviter serrulatus; cyathia solitaria, pedunculi 1.8–3.3 mm longi; involucra campanulata, 1.2–1.7 mm longa, 1.1–1.6 mm lata, pilosa, glandulae 4, ovales, 0.2–0.4 mm longae (radialiter), 0.4–0.7 mm latae (tangentialiter), appendices semicirculares vel flabellatae, 0.4–0.7 mm longae, 0.7–1.1 mm latae; flores staminati ca. 25–35; ovarium trilobatum, ovoideum, versus basim et secus carinas pilosum, styli 3, liberi, 0.3–0.4 mm longi, bipartiti; capsula trilobata, ovoidea, 1.5–1.9 mm longa, 1.4–1.8 mm lata, versus basim et secus carinas pilosa; semina quadrangula, elliptico-ovoidea, 1.1–1.6 mm longa, 0.6–0.8 mm lata.

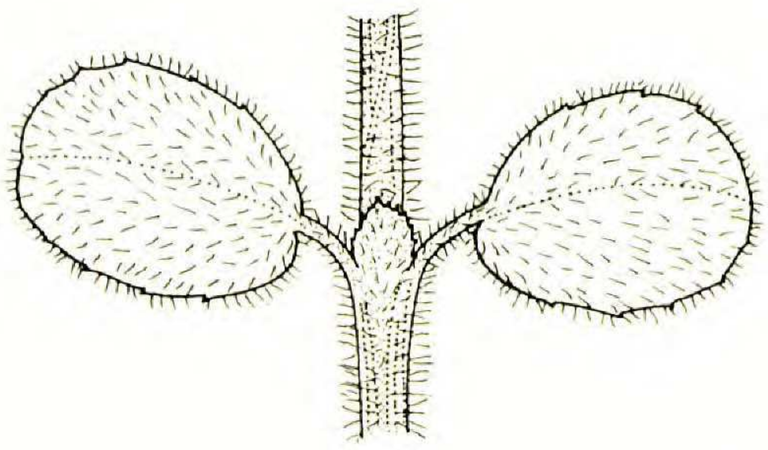
Prostrate to ascending perennial herb from a brown, thickened, and woody tap root; stems numerous arising from near the base, to 25 cm long, internodes to 1.5 cm long, terete, uniformly pubescent around the entire circumference; stems, leaves, peduncles, and involucres shortly pilose with stiff to slightly curved white hairs 0.1–0.2 (–0.3) mm long. Leaves opposite; stipules dimorphic, those of the exposed surfaces of the stem remarkably reduced, inconspicuous, narrowly triangular to subulate, 0.1–0.2 mm long or apparently absent, those facing the ground mostly united into a broadly triangular scale 0.3–0.5 mm long with a laciniate-erose margin; petioles 0.3–0.8 mm long; blades 0.3–0.5 cm long, 0.25–0.35 cm wide, generally oblong but varying to ovate, obovate or orbicular, base asymmetrical and hemicordate, apex rounded, margin entire to faintly serrulate. Cyathia solitary at the distal nodes, peduncles 1.8–3.3 mm long. Involucre 1.2–1.7 mm long, 1.1–1.6 mm wide below the glands, campanulate, inner and outer surfaces pilose, lobes ca. 0.2 mm long, triangular, sinus shallowly U-shaped, extending ca. 1/5 the involucre, glands 0.2–0.4 mm long (radially), 0.4–0.7 mm wide (tangentially), oval, appendages 0.4–0.7 mm long, 0.7–1.1 mm wide, semicircular to flabellate, glabrous or puberulent on the back, entire to shallowly wavy, white fading pink. Staminate flowers ca. 25–35, bracteoles numerous, divided and pilose towards the tip. Gynophore glabrous, exserted 1.3–3.2 mm, ovary conspicuously 3-lobed, ovoid, stiffly pilose with hairs concentrated towards the base and along the keels; styles 3, free, 0.3–0.4 mm long, biparted from 2/3 their length to nearly the base, divisions clavate. Capsule 1.5–1.9 mm long, 1.4–1.8 mm in diameter, strongly 3-lobed, ovoid, broadest towards the base, stiffly pilose with straight, white, erect hairs 0.1–0.2 mm long, these concentrated towards the base and along the keels. Seeds 1.1–1.6 mm long, 0.6–0.8 mm wide, quadrangular in cross section, narrowly elliptic-ovoid in dorsal view, base obliquely truncate, apex pointed, reddish-brown, with a prominent dorsal keel, dorsal faces 0.5–0.7 mm tall, lightly rippled, sometime with a low but conspicuous longitudinal ridge, nearly plane to slightly convex, ecarunculate.

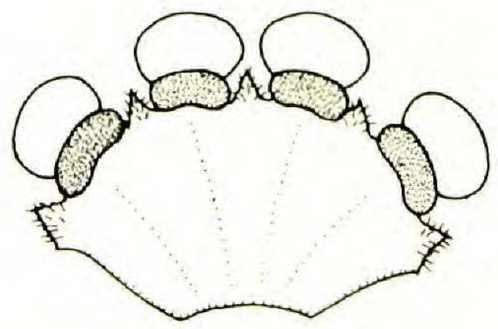
ADDITIONAL SPECIMEN EXAMINED. **Mexico.** MICHOACÁN: Mpio. La Huacana, ca. 1 km W of Los Ranchos, along the dirt road leading to the Sierra Las Cruces, ca. 18°42'N, 102°01'30"W, *Steinmann 3194* (IEB).

The specific epithet refers to the Infiernillo region of southern Michoacán and Guerrero. This area is centered around the Presa Infiernillo, a man-made reservoir resulting from the damming of the Río Balsas just downstream from its confluence with









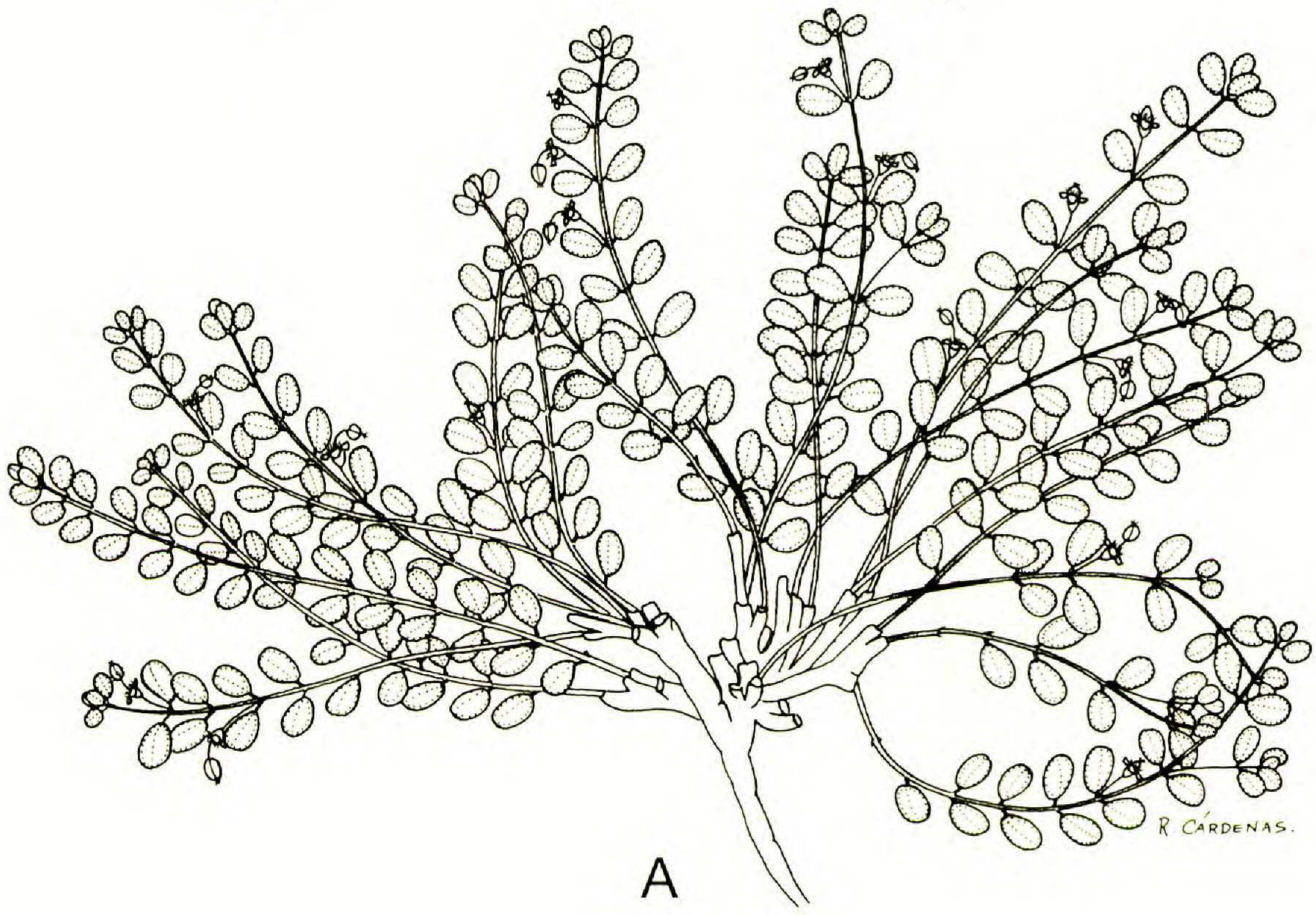


FIG. 2. *Euphorbia infernidialis*. A. Habit, ×1. B. Leaves showing united stipules of the underside of the stem, ×5. C. Cyathium, ×9. D. Involucre dissected, ×10. E. Seed, ventral and dorsal views, ×15.

the Río Tepalcatepec. The only known collections were made just a few kilometers inland from this body of water. *Euphorbia infernidialis* belongs to subg. *Chamaesyce*. The presence of ovaries with hairs restricted to the base and along the keels suggests a relationship with *E. leucantha* (Klotzsch & Garcke) Boiss. and *E. mendezii* Boiss., and both of these species occur in the vicinity. Yet, these species possess strongly dorsiventrally flattened stems with long spreading hairs along the margin, larger stipules, and cyathia in dense and congested lateral shoots of the primary stems. In contrast, *E. infernidialis* has terete stems without long spreading hairs, highly reduced stipules,

and cyathia borne solitary at the distal nodes of the primary stems. Oddly enough, the type collection was made from plants growing in the disturbed roadside directly adjacent to the highway and the only other known collection was made along the side of a dirt road. The adjacent vegetation in both of these areas is arid thorn forest. The only two collections were encountered in full flower during the height of the dry season (March to May), a time during which most members of subg. *Chamaesyce* are dormant. It has also been observed to flower during the summer rainy season.

Euphorbia lottiae V. W. Steinmann, sp. nov.—TYPE: MEXICO. Michoacán: Mpio. Arteaga, 30.5 km (by road) SSE of the junction with MEX 37 along the road to Infiernillo, 18°21'58"N, 101°54'09"W, ca. 300 m, 19 Oct 1996, *V. W. Steinmann & L. Varela E. 1104* (holotype: IEB!; isotypes: ARIZ! MEXU! MICH! NY! UCR!). Fig. 3.

Herba annua ephemera, prostrata vel decumbens; *Euphorbiae barnesii* affinis, a qua foliis basi subpeltatis, ramulis junioribus canaliculatis, pedunculis villosis, pedunculis et stylis longioribus differt.

Delicate, prostrate to decumbent ephemeral, almost turgescent and rather hydrophytic in character, from a slender taproot; stems numerous, prolifically sprawling, to 45 cm long, glabrous, the young ones upon drying usually caniculate with several sharp, whitish to translucent longitudinal ridges. Leaves alternate, well spaced on the stem; stipules inconspicuous and represented by minute, glanduliform protuberances 0.1 mm long; petioles 0.6–2.7 cm long, slender, usually longer than the blade, glabrous or sparsely villous with slender, wavy, white hairs 0.4–1.2 mm long; blade thin and membranaceous, that of the larger leaves 0.9–1.7 cm long, 0.8–1.8 cm wide, broadly ovate to sometimes orbicular, leaves near the branch tips with the blade smaller and generally ovate to elliptic, glabrate above, sparsely villous below with hairs like those of the petiole, rounded or bluntly pointed at the apex, continuous over the adaxial side of the petiole and thus appearing minutely subpeltate at the base, margin entire. Cyathia solitary at the nodes at the distal ends of the stems or on open and loose axillary branches; peduncle 2–9 mm long, slender to capillary, villous at least towards the base. Involucre 0.9–1.1 mm long, 0.7–1.1 mm wide below the glands, campanulate to infundibuliform, sparsely villous on the outer surface, shortly pilose towards the rim on the inner surface, lobes ca. 0.2 mm long, oblong to slightly obovate, fimbriate at the apex; glands 5, 0.1–0.15 mm long (radially), 0.3–0.4 mm wide (tangentially), narrowly oblong to reniform, light yellow becoming pinkish in age, appendages divided into 4–6 filiform segments 0.3–0.6 mm long, green to whitish. Staminate flowers ca. 20–25, bracteoles few, plumose towards the tips. Gynophore slender to capillary, extending to 4 mm long, glabrous, ovary subglobose to oblong, 3-lobed, glabrous; styles 3, 0.5–0.7 mm long, free, biparted to the base, divisions filiform. Capsule 3-lobed, 1.0–1.3 mm long, 1.2–1.4 mm in diameter, subglobose to ovoid or oblong, columella 1.0–1.2 mm long. Seeds 0.9–1.1 mm long, 0.6–0.7 mm in diameter, rounded in cross section, ovoid in dorsal view, light gray to tan, with numerous coarse tubercles interspersed with several mostly regular longitudinal rows of isodiametric depressions the bottoms of which contain a punctiform pit, ecarunculate.

ADDITIONAL SPECIMENS EXAMINED. **Mexico**. JALISCO: along road from Sierra de los Corrales, Mpio. Tecalitlán, to Tepalcatepec, Michoacán, *Dieterle 3049* (IEB, MICH), *Feddema 2230A* (MICH); Mpio. Tecalitlán, cerca de Gallardo, 10 km al NW de Tepalcatepec, Michoacán, *Rzedowski 17497* (ENCB, MICH).—MICHOACÁN: 11–13 km WSW of Apatzingán, along the road to Dos Aguas and Aguililla, *Dieterle 4308* (MICH); Mpio. Arteaga, 9 km al N de Infiernillo, 31 km al S de la carr. Arteaga–Nueva Italia, *Lott et*

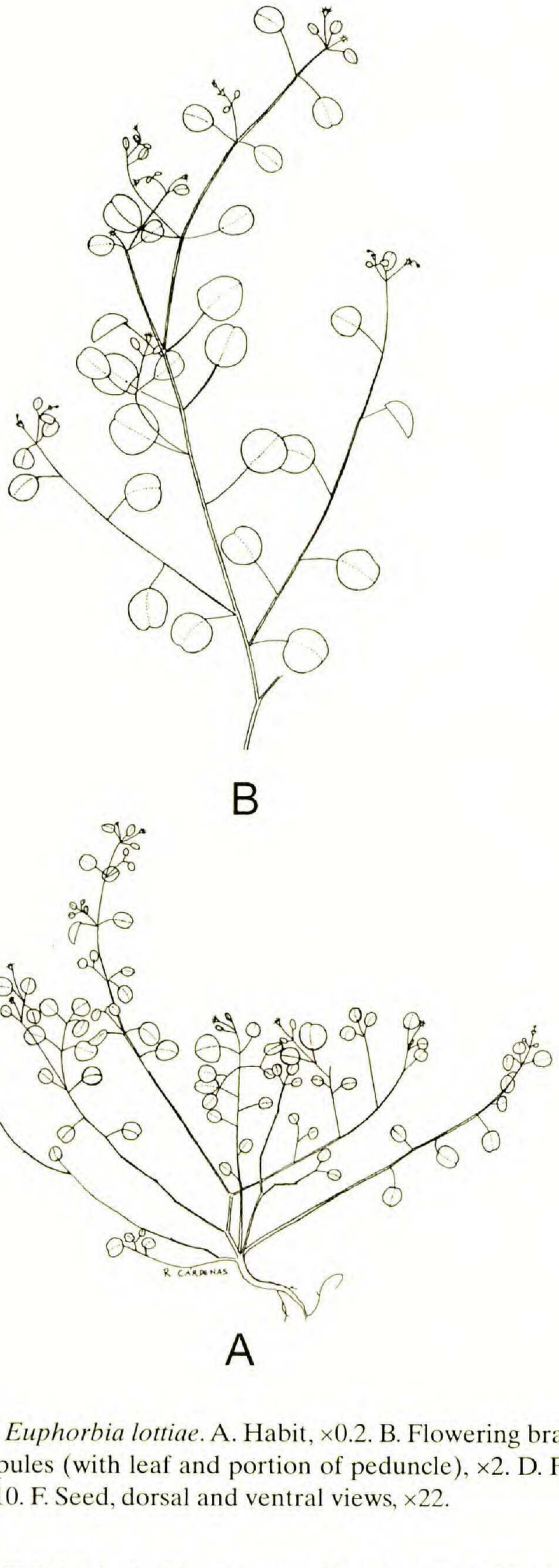


FIG. 3. *Euphorbia lottiae*. A. Habit, ×0.2. B. Flowering branch, ×0.4. C. Node showing minute glanduliform stipules (with leaf and portion of peduncle), ×2. D. Flowering tip of branch, ×2. E. Cyathium dissected, ×10. F. Seed, dorsal and ventral views, ×22.

al. 2001 (MICH); Mpio. La Huacana, ca. 4 km (by road) SE of San Pedro Barajas, along MEX 37, base of cliffs on the hills W of El Limoncito, 18°46'N, 102°01'30"W, *Steinmann & Pérez 2729* (IEB).

This species is dedicated to Emily J. Lott, Euphorbiaceae enthusiast and a leading authority on the plants of the tropical deciduous forest of western Mexico. She collected the species at the type locality in 1983. *Euphorbia lottiae* belongs to subg. *Agaloma* and is a member of the *E. ocymoidea* L. complex. McVaugh (1993) provided a general overview of this group, recognizing three varieties of *Euphorbia ocymoidea*: var. *barnesii* (Millsp.) McVaugh, var. *ocymoidea*, and var. *subreniformis* (S. Watson) McVaugh. I agree with McVaugh concerning the taxa recognized as well

as the characters used to distinguish them; however, I differ with him in the belief that they are best treated as distinct species as opposed to infraspecific taxa. These, together with *Euphorbia lottiae*, probably form a monophyletic group and are indeed very similar, so their rank is somewhat arbitrary. I prefer to recognize them as species for various reasons. All are morphologically distinct from each other by more than a single character. There are ecological differences as well, with *E. lottiae* and *E. ocymoidea* growing at low elevations in tropical vegetation, *E. subreniformis* S. Watson occurring at higher elevations in mostly pine-oak forest, and *E. barnesii* (Millsp.) Oudejans occurring in both such habitats. Furthermore, their ranges are independent, and they maintain their distinctiveness even when growing in the same general area. In McVaugh's 1993 key, *Euphorbia lottiae* would come out to *E. barnesii*, and some specimens were initially identified as such. Although these two share consistently 5-glanded involucres, glabrous ovaries and capsules, slender to capillary gynophores, and eglandular branchlets, they differ in a number of features. The following couplet serves to distinguish them.

1. Young stems drying terete; long spreading hairs restricted to the outer surface of the involucre; base of the leaf blade attached to the adaxial side of the petiole and not continuous over it; peduncles 0.5–1 (–1.5) mm long, glabrous; styles 0.3–0.4 mm long. *E. barnesii*
1. Young stems, upon drying, usually caniculate with several sharp, whitish to translucent longitudinal ridges; long spreading hairs sometimes present on the stems and leaves in addition to the involucres; base of the leaf blade continuous over the adaxial side of the petiole and thus appearing minutely subpeltate; peduncles 2–9 mm long, villous at least towards the base; styles 0.5–0.7 mm long. *E. lottiae*

Euphorbia lottiae also appears to differ from the other species of the complex by its habit. It is almost turgescent and rather hydrophytic in character, whereas its close relatives possess more wiry and fibrous stems. As far as I can tell, the branches of the others are mostly erect to ascending. In contrast, the branches of *E. lottiae* are weak, primarily prostrate to decumbent, and prolifically sprawling. This species is known from a small number of collections gathered at four localities in the valley of the Río Tepalcatepec in southern Michoacán and adjacent Jalisco, where it occurs in thorn forest and tropical deciduous forest at elevations ranging from 300 to 500 m. It likely also grows in Guerrero; the type locality is only about 3 kilometers from the border and with vegetation similar to that of vast expanses in adjacent Guerrero. It thrives during the brief rainy season, but is one of the first plants to wilt and die as the rains diminish and the soil dries. All known collections were made from early September to late October.

Jatropha jaimejimenezii V. W. Steinmann, sp. nov.—TYPE: MEXICO. Michoacán: Mpio. Arteaga, along MEX 37, ca. 75 km (by road) N of Arteaga and 1 km S of El Descansadero, 18°38'41"N, 101°58'10"W, ± 300 m, shallow ravine on the rocky hillside above the highway, open thorn forest with columnar cacti, 3 Aug 2001, *V. W. Steinmann, E. Carranza & E. Pérez 1810* (holotype: IEB!; isotypes: ARIZ! MICH! DAV!). Fig. 4.

Frutex usque ad 2 (–3) m altus, monoecius; folia alterna, stipulae in lacinias glanduligeras dissectae, 1–2.5 mm longae, petioli 0.3–1.2 (–1.5) cm longi, laminae variabiles, plerumque oblongae, (0.7–) 1.0–3.8 cm longae, (0.6–) 0.8–3.6 cm latae, apice obtusae, basi obtusae vel truncatae, margo glanduloso-denticulatus; inflorescentiae cymosae, dichasiales, 1.5–4.5 cm longae, bracteae ellipticae vel spathulatae, 2–9 mm longae, 0.5–2.5 mm latae, pilosae, margo glanduloso-denticulatus; florum

staminatorum pedicelli graciles, 3.2–5.5 mm longi, pilosi, calyx imbricatus, lobi 5, ovati, oblongi vel elliptici, liberi, 3.2–5.5 mm longi, 0.9–2.3 mm lati, corolla imbricata, lobi 5, spathulati vel oblongi, basi connati, 5.4–6.2 mm longi, 1.7–2.2 mm lati, apice reflexi, stamina 5, in columnam connata 3.8–5.2 mm longa, antherae oblongae, 1.1–1.4 mm longae; florum pistillatorum pedicelli 1.8–3.5 mm longi, villoso-pilosi, calyx imbricatus, lobi 5, plerumque obovati vel spathulati, accrescentes, 6.5–11.8 mm longi, 2.6–5.4 mm lati, corolla imbricata, lobi 5 (6), ovati, 5.3–6.0 mm longi, 2.0–2.5 mm lati, apice reflexi, ovarium triloculatum, oblongo-ovoideum, basi planum, glabrum, styli 3, filiformes, 3.1–4.3 mm longi; capsula oblongo-ovoidea, 0.9–1.2 cm longa, 0.7–0.8 cm lata, trilobata; semina oblonga, 6.5–7.3 mm longa, 3.9–4.4 mm lata, laevia, caruncula cuculliformis, 1.4–1.9 mm longa, 2.7–3.2 mm lata.

Shrubs to 2 (–3) m tall, multibranched from near the base and highly branched above, drought-deciduous, with copious reddish latex, monoecious; stems villous, the hairs nearly straight, 1.1–2.2 mm long, multicellular, white and sometimes purplish at the base, lower layer of shorter appressed to recurved hairs also present, branches soft-wooded and flexible, bark brown to reddish brown, slightly roughened and exfoliating in thin slivers. Leaves alternate, mostly congested on short, arrested shoots; stipules represented by irregularly multifid stipitate-glandular structures 1–2.5 mm long; petiole 0.3–1.2 (–1.5) cm long, with pubescence like that of the stem; blade (0.7–) 1.0–3.8 cm long, (0.6–) 0.8–3.6 cm wide, membranaceous, with basal attachment to the petiole, mostly oblong but varying from ovate to elliptic, rarely rotund or shallowly palmately 3-lobed, palmately 3-veined from the base with the midvein more prominent than the laterals, apex obtuse, base truncate to obtuse, hirsute to villous on both surfaces, margin minutely denticulate with teeth ending in stipitate glands 0.1–0.2 mm long, in age the glands sometime shed and the margin appearing entire. Inflorescences many-flowered dichasial cymes 1.5–4.5 cm long, entirely staminate or with pistillate flowers at the lower first and second nodes, pistillate flowers also sometimes solitary on the short shoots, axis with pubescence as on the stem but the hairs tending to be shorter, peduncle 0.4–2 cm long, bracts 2–9 mm long, 0.5–2.5 mm wide, narrowly elliptic to spathulate, thinly pilose, the margin as in the leaves. Staminate flowers on slender, pilose pedicels 3.2–5.5 mm long; calyx strongly imbricate, lobes 5, 3.2–5.5 mm long, 0.9–2.3 mm wide, ovate to oblong or elliptic, slightly unequal, free to the base, apex mostly obtuse, rarely acute, pilose to puberulent on the outside, mostly glabrous within, rarely ciliate with stipitate glands; corolla strongly imbricate, lobes 5, 5.4–6.2 mm long, 1.7–2.2 mm wide, broadly spathulate to oblong, united 1/5 to 1/4 their length, apex obtuse, glabrous to minutely puberulent, often puberulent-ciliate, red-pink, free portion strongly overlapping and appearing united towards the base but clearly separate above, tips reflexed at anthesis; disk glands 5, 0.6–1.1 mm long, separate, ± oblong, dark brown; stamens 5, united into a column 3.8–5.2 mm long, free for 0.3–0.8 mm, anthers 1.1–1.4 mm long, narrowly oblong, sometimes with a filiform appendage 0.5–1.7 mm long arising from between the anthers, outer whorl of stamens absent. Pistillate flowers on relatively stout, villous-pilose pedicels 1.8–3.5 mm long; calyx imbricate, lobes 5, strongly unequal, generally obovate to spathulate, rarely oblong or ovate, accrescent in fruit and expanding to 6.5–11.8 mm long, 2.6–5.4 mm wide, apex obtuse or acute, thinly pilose on both surfaces, stipitate-glandular along the margin; corolla strongly imbricate, lobes 5 (6), 5.3–6.0 mm long, 2.0–2.5 mm wide, ovate, united only at the extreme base, apex obtuse, thinly pilose on both surfaces, pilose- or puberulent-ciliate, pink, tips reflexed at anthesis, caducous and falling as a single unit, disk annular, undulate and shallowly lobed; ovary 3-locular, oblong-ovoid with a flat base, inconspicuously 3-angled, glabrous, styles 3, 3.1–4.3 mm long, filiform,

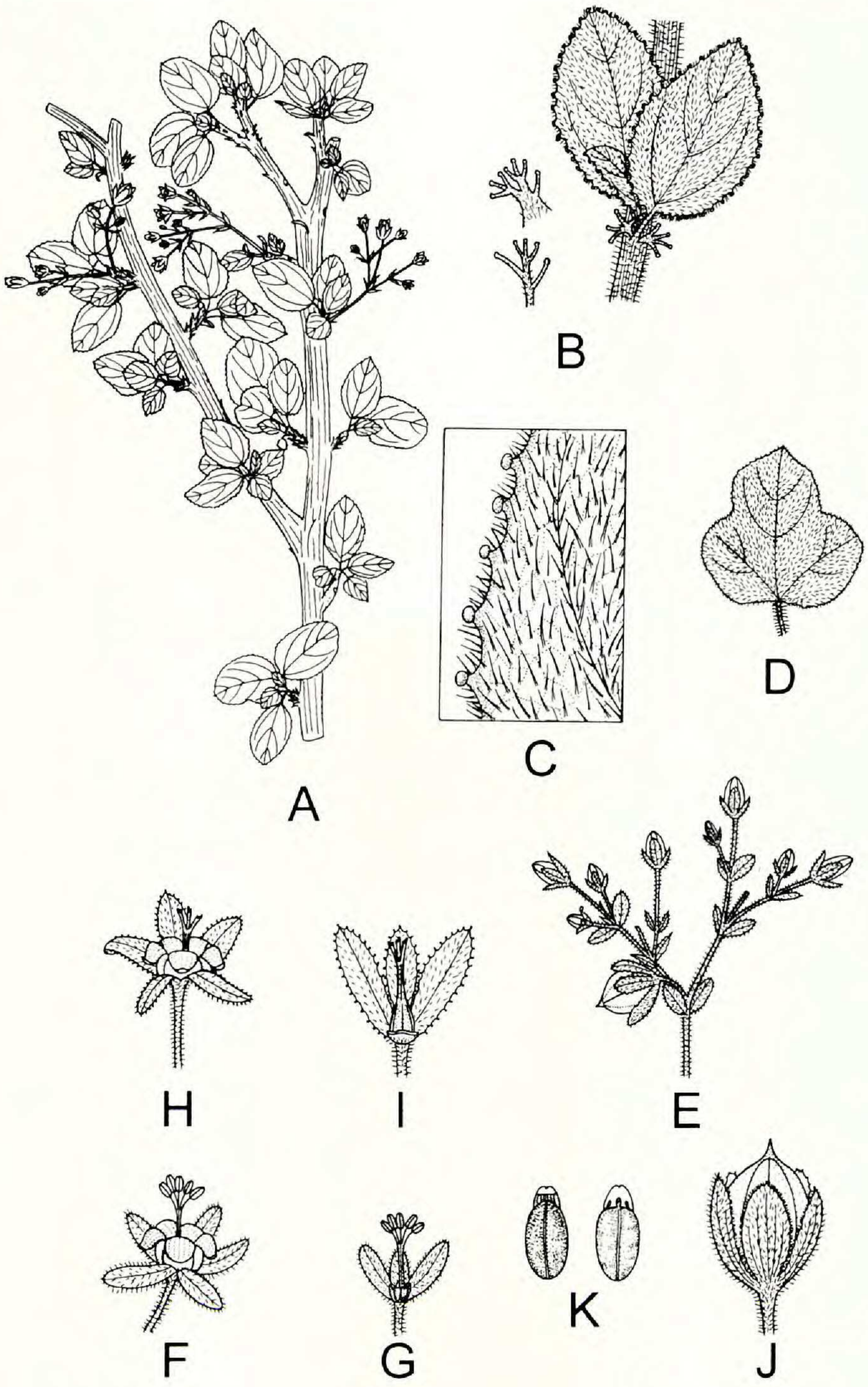


FIG. 4. *Jatropha jaimejimenezii*. A. Flowering branch, ×0.5. B. Node with leaves and stipules, ×1, and detail of two stipules. C. Leaf margin, ×5. D. 3-lobed leaf, ×0.4. E. Inflorescence, ×1. F. Staminate flower, ×1.3. G. Staminate flowers with petals and two sepals removed, ×1. H. Pistillate flower, ×1.5. I. Pistillate flowers with petals and two sepals removed, ×1.5. J. Capsule with accrescent sepals, ×1.2. K. Seed, dorsal and ventral views, ×1.2.

united into a slender column for 1/2–3/4 their length, stigma bifid and slightly dilated. Capsule 0.9–1.2 cm long, 0.7–0.8 cm in diameter, broadly oblong-ovoid, conspicuously 3-lobed in cross section, with a sharp, pointed beak resulting from the persistent base of the stylar column, generally 3-seeded although sometimes 2-seeded by abortion. Seeds 6.5–7.3 mm long, 3.9–4.4 mm wide, oblong in dorsal view, apex and base rounded, mottled light to dark brown, smooth, caruncle 1.4–1.9 mm long, 2.7–3.2 mm wide, hoodlike, mostly dark brown to nearly black.

ADDITIONAL SPECIMENS EXAMINED. **Mexico**. MICHOACÁN: Mpio. La Huacana, laderas al O de El Limoncito, 3.2 km al ESE de San Pedro Barajas, 18°46'53"N; 102°01'12"W, *Carrillo & Pérez 3188* (IEB); Mpio. Arteaga, along MEX 37, ca. 75 km (by road) N of Arteaga and 1 km S of El Descansadero, 18°38'41"N, 101°58'10"W, *Steinmann 1706* (IEB), *Steinmann & Steinmann 1654* (IEB), *Steinmann & Varela 1123* (IEB);

Mpio. La Huacana, 4 km (by road) SE of San Pedro Barajas, along MEX 37, hills W of El Limoncito, ca. 18°46'N, 102°01'30"W, *Steinmann, Lubinsky & Lubinsky 2692* (IEB).

This species is named for Jaime Jiménez Ramírez of the Facultad de Ciencias of the Universidad Nacional Autónoma de México. His many contributions on Euphorbiaceae and in particular *Jatropha*, including the descriptions of various new species, have greatly enhanced our understanding of the family in Mexico. The affinities of *Jatropha jaimejimenezii* are not obvious, and even its subgeneric placement is problematic. Following the classification of *Jatropha* proposed by Dehgan and Webster (1979), it belongs to subg. *Jatropha*. This is due to its monoecious sexuality, glandular-dissected stipules, and oblong seeds with a well-developed caruncle; however, I cannot further accommodate it within any of the sections. The most unusual feature of this species is the presence of only 5 monadelphous stamens with the second whorl of stamens completely absent. As far as I know this morphology is unique within the genus, and according to Dehgan and Webster (1979) all other species have 8 or 10 stamens, except for *J. podagrica* Hook. in which the stamens vary from 6 to 14. The two known stations of *J. jaimejimenezii* are within 20 km of each other in the Infiernillo region of southern Michoacán. The species occurs from 300 to 400 m elevation on rocky hillsides in relatively open thorn forest dominated by species of *Bursera*, *Croton*, *Krameria*, *Pseudosmodingium*, *Rahcoma*, and *Randia*, together with several columnar cacti and numerous leguminous shrubs and small trees. Flowering and fruiting overlap and occur during the rainy season from June to September.

Manihot mcvaughii V. W. Steinmann, sp. nov.—TYPE: MEXICO. Michoacán: Mpio. Arteaga, along MEX 37, ca. 75 km (by road) N of Arteaga and 1 km S of El Descansadero, 18°38'41"N, 101°58'10"W, ± 300 m, shallow ravine on the rocky hillside above the highway, open thorn forest with columnar cacti, 3 Aug 2001, *V. W. Steinmann, E. Carranza & E. Pérez 1811* (holotype: IEB!; isotypes: ARIZ! MICH! DAV!). Fig. 5.

Frutex usque ad 1.5 (–2.5) m altus, monoecius, glaber; folia alterna, decidua, stipulae glandulosae, 0.1–0.2 mm longae, petioli (0.5–) 0.9–2.4 mm longi, laminae 3–5-lobatae, 1.5–4.5 cm longae, 1.5–6.5 cm latae; flores solitarii vel binati; florum staminatorum pedicelli graciles, 0.7–2.4 cm longi, calyx campanulatus, 1–1.3 cm longus, 0.8–1.2 cm latus, sepala 5, basi connata, lobi ovati, 5.2–7.0 mm longi, 2.4–3.2 mm lati, stamina 8, filamenta filiformia, 6.5–7.5 mm longa, antherae anguste oblongae, 2.4–2.9 mm longae, 0.4–0.6 mm latae; florum pistillatorum pedicelli graciles, 0.5–1.1 cm longi, sepala 5, libera, anguste ovata, 8–12 mm longa, 2.5–3.2 mm lata, ovarium ellipsoideum, styli 3, 1.7–2.0 mm longi, capsula subglobosa, 0.9–1.0 cm diametro; semina elliptico-oblonga, 6.1–6.5 mm longa, 3.9–4.1 mm lata, complanata, caruncula 2.1–2.4 mm longa, 2.8–3.2 mm lata.

Dense, intricately branched shrubs to 1.5 (–2.5) m tall, glabrous throughout, drought-deciduous, with milky latex, monoecious; bark reddish brown, generally smooth and shiny. Leaves alternate, mostly well spaced on the stem, sometimes congested, stipules represented by minute, glandlike protuberances 0.1–0.2 mm long; petioles (0.5–) 0.9–2.4 mm long, slender; blade 1.5–4.5 cm long, 1.5–6.5 cm wide, membranaceous, with basal attachment to the petiole, deeply palmately 3–5-lobed, leaf venation camptodromous, central and adjacent lobes mostly obovate when young but becoming panduriform with development, 1.0–4.2 cm long, 0.8–2.9 cm wide, apex acute, central lobe only slightly larger than to nearly twice as long as the

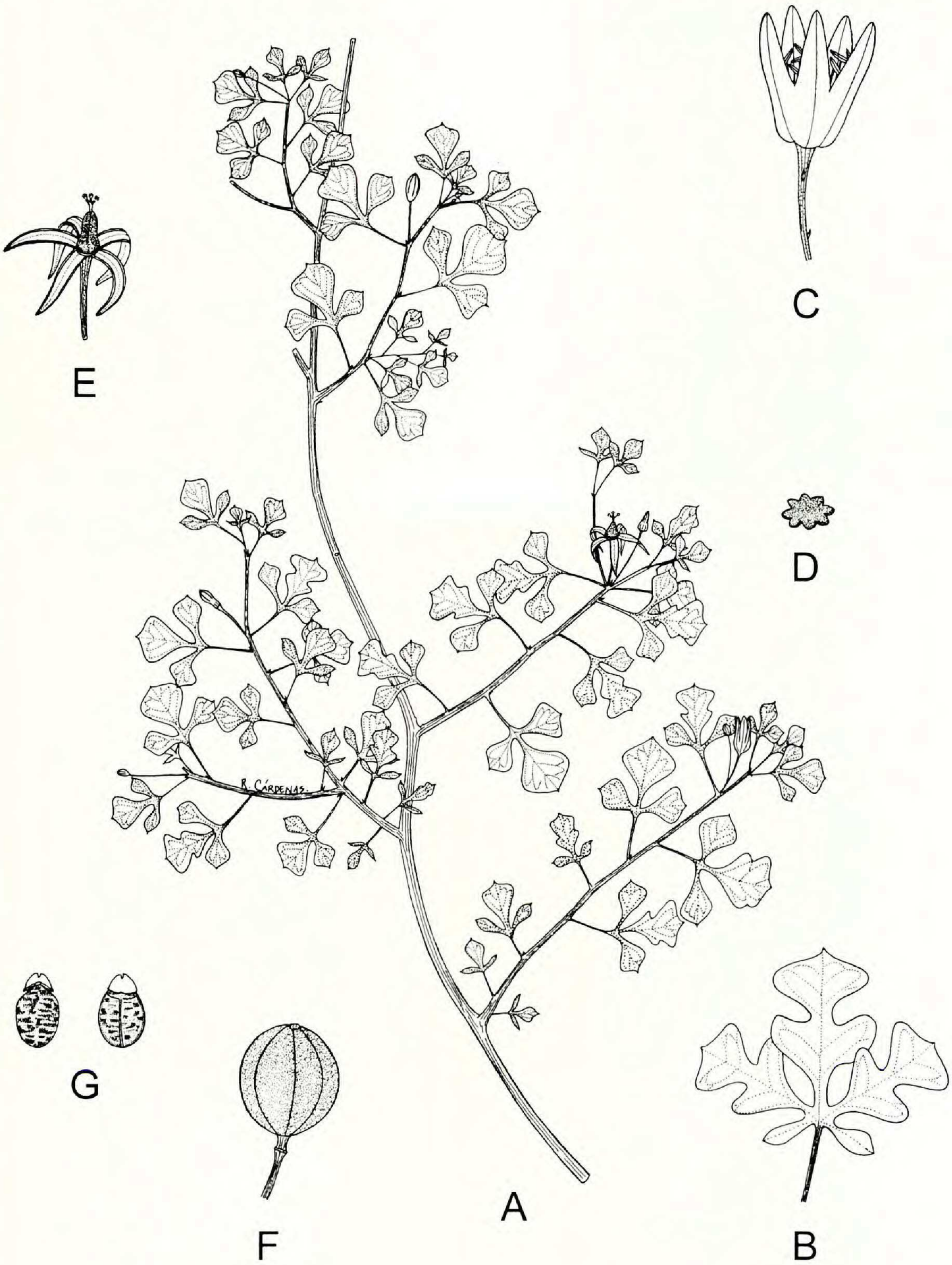


FIG. 5. *Manihot mcvaughii*. A. Flowering branch with young leaves, ×0.5. B. Mature leaf, ×0.6. C. Staminate flower, ×1.5. D. Staminate disk, ×2. E. Pistillate flower, ×1. F. Capsule, ×1.5. G. Seed, dorsal and ventral views, ×1.3.

adjacent lobes, apex of the secondary lobes rounded, basal lobes 0.4–1.2 cm long, 0.1–0.6 cm wide, spathulate to obovate or falcate, lacking on young leaves. Flowers solitary or in staminate-pistillate pairs (rarely in fasciculate groups of 3), borne near the branch tips. Staminate flowers on slender pedicels 0.7–2.4 cm long and with 3–9 minute, triangular-subulate bracteoles 0.2–0.3 mm long; calyx 1–1.3 cm long, 0.8–1.2 cm wide at the tip, campanulate, composed of 5 sepals united ca. 1/2 their length, the free lobes 5.2–7.0 mm long, 2.4–3.2 mm wide at the base, ovate, obtuse at the apex, yellow at maturity; disc 2.8–3.1 mm in diameter, flattened, conspicuously 8-lobed;

stamens 8, arising from between the lobes of the disc, filaments 6.5–7.5 mm long, filiform, anthers 2.4–2.9 mm long, 0.4–0.6 mm wide, versatile, narrowly oblong, rounded at the ends, opening by longitudinal slits. Pistillate flowers on slender pedicels 0.5–1.1 cm long, with 1 or 2 minute, triangular-subulate bracteoles 0.2–0.3 mm long; sepals 5, 8–12 mm long, 2.5–3.2 mm wide, free to the base, narrowly ovate, obtuse to subacute at the apex, yellow-green, sometimes reflexed at maturity; disc thick and fleshy, entire, ovary ellipsoid, without ribs; styles 3, 1.7–2.0 mm long, united ca. 1/2 their length, dilated into highly lobed, papillose stigmas at the tips. Capsule with both septicidal and loculicidal dehiscence, on a stout stipe 1–2 mm long, globose, 0.9–1.0 cm in diameter, without ribs, rounded at the apex, light green to yellow-green, with 7 or 8 dark green longitudinal lines, minutely and irregularly papillose. Seeds 6.1–6.5 mm long, 3.9–4.1 mm wide, elliptic-oblong in dorsal view, dorsiventrally flattened, rounded at the base, with a blunt point at the apex, smooth, grayish to light brown, mottled with irregular blackish markings, caruncle 2.1–2.4 mm long, 2.8–3.2 mm wide, fleshy, light yellow, frequently notched at the apex.

Additional Specimens Examined. **Mexico**. Michoacán: Mpio. Arteaga, along MEX 37, ca. 75 km (by road) N of Arteaga and 1 km S of El Descansadero, 18°38'41"N, 101°58'10"W, *Steinmann & Steinmann 1651* (DAV, IEB, MICH), *Steinmann & Varela 1122* (IEB); Mpio. La Huacana, 4 km (by road) SE of San Pedro Barajas, along MEX 37, base of cliffs on the hills W of El Limoncito, ca. 18°46'N, 102°01'30"W, *Steinmann & Pérez 2910* (IEB).

It is a pleasure to name this species after Rogers McVaugh, renowned botanist and expert on the flora of western Mexico. Its initial discovery is in fact due to him, as it was first encountered while in search of *Euphorbia arteagae* Buck & Huft around its type locality, a site visited by McVaugh in 1965. *Manihot mcvaughii* is noteworthy for its relatively small leaves and flowers, which are solitary or paired. In almost all other species of *Manihot* the flowers are arranged in well-differentiated racemes or panicles and the leaves are considerably larger. The only other species to possess such traits is *M. pauciflora* Brandegee of the Tehuacán-Cuicatlán valley of Puebla and Oaxaca. Rogers and Appan (1973) assigned *M. pauciflora* to a monotypic segregate genus, *Manihotoides* Rogers & Appan, but it appears to represent an arid-adapted species of *Manihot*, and most subsequent authors have treated the two names as synonyms (e.g., Webster 1994; Martínez et al. 2002). *Manihot mcvaughii* occurs in the most xeric region of the Balsas Depression; whether it is closely related to *M. pauciflora* or shares with it characteristics because of similar selective pressures remains to be determined. Interestingly, the only known localities of *M. mcvaughii* are the same three at which *Jatropha jaimejimenezii* occurs, and at all of these sites the two species grow side-by-side. The two species also share a similar period of reproduction, with flowering and fruiting during the rainy season from June to September.

ACKNOWLEDGMENTS

I thank Rogelio Cárdenas for preparing the illustrations; Grady Webster for reviewing the manuscript; W. R. Anderson for assistance in preparing the Latin descriptions; Eleazar Carranza González, Emmanuel Perez Calix, Perla Ivonne Steinmann, and Leonardo Varela Espinosa for assisting in the field; and the herbaria of ENCB, IEB, MEXU, and MICH for providing access to their collections. Economic support was provided by a grant from the Comisión Nacional para el Conocimiento y Uso de la Biodiversidad to the Instituto de Ecología, A.C. (account number 902-03).

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